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Notes:

1. Untranslatable words are replaced with asterisks. (****).
2. Texts in the figures are not translated and shown as figs.

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CLAIM + DETAILED DESCRIPTION

(57) [Claim(s)]

[Claim 1] Between the inner discharge jets (33) arranged the inner surface of the outer discharge jet (35) linked to a weld metal powder feed unit (19), and inside the outer discharge jet (35) concerned In the laser welding nozzle apparatus in which the space (41) which passes a weld metal powder was formed [that the location of the centralization part (FS) of the weld metal powder which blows off from said space (41) should be adjusted to each location of a location and a lower part location which, and was in agreement] [a location] [of the spot (LS) of the laser light irradiated from said discharge-jet apparatus] [upper part] The laser welding nozzle apparatus characterized by preparing an inner discharge jet (33) free [up-and-down centering control] to said outer discharge jet (35).

[Detailed Description of the Invention]**[Objects of the Invention]****(Field of the Invention)**

This invention relates to the laser welding nozzle apparatus which welds by laser light.

(PRIOR ART)

The automatic feed unit of metal wire material is used for laser welding, for example, and there are some which weld to the melting region of the irradiation point of the laser light made to a weldment during processing by supplying metal wire material automatically in it. However, the spot diameter of laser light was usually small at about 0.1-0.4mm compared with the path of metal wire material, therefore it was dramatically difficult to supply metal wire material to a melting region with constant speed, and to melt all of metal wire material.

For this reason, although the approach of powdering metal wire material and adhering this to the weldment beforehand was developed, since the amount of supply of metallic powder was

uncontrollable by this approach during processing, it was difficult [it] to obtain a uniform bead.

The side nozzle was attached to the head part of a laser beam machine, and the approach of supplying metallic powder has been developed near the irradiation point of the laser light to a weldment so that the amount of supply of metallic powder can be controlled these days.

(Object of the Invention)

As mentioned above, there was a problem in the conventional laser welding approach, respectively. Moreover, in order that the approach of supplying metallic powder from the side nozzle developed in order to solve these problems might also supply metallic powder from the side, it was hard to supply it to a melting region uniformly, and it had the problem that a discharge-jet part became comparatively complicated.

It was originated in view of such a problem, and this invention aims at offering the laser welding nozzle apparatus which can obtain a comparatively easy and uniform bead.

[Elements of the Invention]

(The means for solving a technical problem)

In view of the conventional problem like the above-mentioned, [this invention] Between the inner surface of the outer discharge jet linked to a weld metal powder feed unit, and the inner discharge jet arranged inside the outer discharge jet concerned In the laser welding nozzle apparatus in which the space which passes a weld metal powder was formed It is the architecture of having prepared the inner discharge jet free [up-and-down centering control] to said outer discharge jet that the location of the centralization part of the weld metal powder which blows off from said space should be adjusted to each location of a location and a lower part location which, and was in agreement. [a location] [of the spot of the laser light irradiated from said discharge-jet apparatus] [upper part]

(EXAMPLE)

Next, the work example of this invention is explained based on Drawings. Fig. 4 is a front view of NC carbon-dioxide-gas-laser processing machine which carried out this invention. Like a graphic display, [this NC carbon-dioxide-gas-laser processing machine 1] [the laser oscillation apparatus 3, a laser head 5, and this] It consists of double discharge-jet 21 grade prepared in the lower part of the laser head dislodging apparatus 7 moved to XY shaft orientations which intersect perpendicularly free, the column 9 of four which supports this, the weldment mount 11, the electric power unit 13, NC unit 15, the console panel 17, the weld metal powder feed unit 19, and the laser head 5.

The laser head dislodging apparatus 7 consists of a servo-motor, a ball screw device, etc. which were prepared in the X-axis and Y shaft orientations, respectively, is controlled by the signal of NC unit 15, and moves a laser head 5 horizontally. Dislodging of Z shaft orientations of a laser head 5, i.e., a sliding direction, is performed by the servo-motor formed in the upper

part of the laser head 5. Moreover, although the double discharge jet 21 prepared in the lower part of the laser head 5 is vertical, it can also be made to usually incline to a horizontal direction corresponding to the welding area of a weldment.

Next, Fig. 1 explains the weld metal powder feed unit 19 and the double discharge jet 21. Like a graphic display, the weld metal powder feed unit 19 consists of a body 23 and control-device 25 grade. [with the pressure of gas, such as Ar to which a body 23 receives the weld metal powder which falls from the weld metal powder hopper 27 formed in the upper part in the top face of the armature driven by the built-in motor, and this is supplied from the carrier gas line 29, or HI,] It is constituted so that the double discharge jet 21 may be supplied from the powder supply pipe 31. The control device 25 performs opening and closing of the valve prepared in the carrier gas line 29 etc. while it controls the engine speed of the motor which drives the aforementioned armature and adjusts the powdered amount of supply. The double discharge jet 21 consists of outer discharge-jet 35 grade which are the inner discharge jet 33 which is an irradiation discharge jet of laser light, and a powder injection nozzle like a graphic display, and can move the inner discharge jet 33 now to a sliding direction with Drawings to the outer discharge jet 35 and the condenser 37. In this drawing, the centralization part FS of the spot LS of laser light and a weld metal powder is in agreement on the surface of Weldment W.

The ring 39 for a partition is formed in the upper part of the inner discharge jet 33 and the outer discharge jet 35, space 41 is formed among both discharge jets, and a weld metal powder (it expresses with the aggregation of a point) passes through the inside of this with gas pressure. Fig. 2 (a) is an Ila-Ila sectional view of the double discharge jet 21. Fig. 2 (b) is other work examples which established the spline-like slot in the inner surface of the outer discharge jet 35, and since they can make the cross-sectional area of each slot the same, they can spout a weld metal powder comparatively uniformly.

The spot LS of the laser light at the time of moving the inner discharge jet 33 to a sliding direction and the physical relationship of the centralization part FS of a weld metal powder become like at Fig. 3 . (a) By the case where the lower limit of the inner discharge jet 33 and the outer discharge jet 35 is united, drawing shows that FS becomes the upper part from LS. (b) Corresponding to the movement magnitude, FS shows that LS, agreement, or FS becomes a lower part from LS, respectively by the case where drawing and the (c) figure move the inner discharge jet 33 upwards from the location of the (a) figure. Thus, since a weld metal powder can be freely supplied near the melting region of the irradiation point of laser light, a uniform bead can be obtained to a weldment.

[Effect of the Invention]

It sets to this invention so that I may be understood from description of a work example at the above time. [the location of the centralization part FS of the weld metal powder which blows

off from the space 41 between the inner discharge jet 33 and the outer discharge jet 35 in a discharge-jet apparatus] [that it should adjust to each location of a location and a lower part location which, and was in agreement] [a location] [of the spot LS of laser light] [upper part] Since the inner discharge jet 33 is formed free [up-and-down centering control] to the outer discharge jet 35 It can respond to the groove shape of the part which welds a work piece, and the location of the centralization part FS of a weld metal powder can be adjusted to the location of the spot LS of laser light in the location and lower part location which and were in agreement. [the location] [upper part] Improvement in welding quality can be aimed at according to the amount of the weld metal powder supplied corresponding to groove shape.

[Translation done.]